

CLAIMS

1. A method of efficiently storing an effective address (EA) used by a thread in an Effective to Real Address Translation (ERAT) table, in a main processing unit  
5 (MPU) having two or more threads, the method comprising the steps of:

defining a thread valid indicator for each thread in the MPU;

storing an EA using one ERAT table entry; and

10 setting a thread valid indicator in the ERAT table entry for each thread using the EA to refer to the same RA.

2. The method of Claim 1, further comprising translating the effective address (EA) to a real address  
15 (RA) using an Effective to Real Address Translation (ERAT) table.

3. The method of Claim 2, further comprising:

determining whether the EA matches an ERAT table entry;

20 upon determining that the EA matches an ERAT table entry, determining whether the matching entry is marked valid for this thread;

upon determining that the matching entry is marked valid for this thread, looking up the corresponding RA in  
25 the data array table and outputting the RA;

upon determining that the matching entry is not marked valid for this thread but is marked valid for other threads, determining whether the information in the matching entry is correct for this thread;

30 upon determining that the information in the matching entry is correct for this thread, setting a valid indicator marking the entry as valid for this thread also;

upon determining that the information in the matching entry is not correct for this thread, or that the EA does not match any ERAT table entry, writing a new ERAT table entry for the EA and marking it valid for this thread.

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4. The method of Claim 3, wherein when writing a new ERAT table entry for the EA, the entry's thread valid indicators are set to show the entry is valid for all threads using the EA to refer to the RA.

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5. The method of Claim 1, further comprising invalidating the EA entry in the ERAT table.

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6. The method of Claim 5, further comprising:  
determining the threads for which the EA entry is no longer valid; and  
setting the thread valid indicators, for those threads for which the EA entry is no longer valid, to invalid in the EA entry.

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7. The method of Claim 1, further comprising writing the EA to the ERAT table.

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8. The method of Claim 7, further comprising:  
presenting the EA used by the thread;  
determining that the EA does not match any entry in the ERAT table;  
retrieving an RA for the EA using a secondary translation;  
writing a new entry containing the EA; and  
setting the entry's thread valid indicator to show the EA entry is valid for the thread.

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9. The method of Claim 8, wherein the entry's thread valid indicators are set to show the entry is valid for all threads using the EA to refer to the RA.

5        10. An apparatus for efficiently storing an effective address (EA) used by a thread in an Effective to Real Address Translation (ERAT) table, in a main processing unit (MPU) having two or more threads, the apparatus comprising:

10        means for defining a thread valid indicator for each thread in the MPU;

      means for storing an EA using one ERAT table entry; and

      means for setting a thread valid indicator in the ERAT table entry for each thread using the EA to refer to the same RA.

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      11. The apparatus of Claim 10, further comprising translating the EA to an RA using an ERAT table.

      12. The apparatus of Claim 11, further comprising:

20        means for determining whether the EA matches an ERAT table entry;

      upon determining that the EA matches an ERAT table entry, means for determining whether the matching entry is marked valid for this thread;

25        upon determining that the matching entry is marked valid for this thread, means for looking up the corresponding RA in the data array table and means for outputting the RA;

      upon determining that the matching entry is not marked  
30        valid for this thread but is marked valid for other threads, means for determining whether the information in the matching entry is correct for this thread;

      upon determining that the information in the matching

entry is correct for this thread, means for setting a valid indicator marking the entry as valid for this thread also;

upon determining that the information in the matching entry is not correct for this thread, or that the EA does  
5 not match any ERAT table entry, means for writing a new ERAT table entry for the EA and means for marking it valid for this thread.

13. The apparatus of Claim 12, wherein when writing a  
10 new ERAT table entry for the EA, the entry's thread valid indicators are set to show the entry is valid for all threads using the EA to refer to the RA.

14. The apparatus of Claim 10, further comprising  
15 invalidating the EA entry in the ERAT table.

15. The apparatus of Claim 14, further comprising:  
means for determining the threads for which the EA entry is no longer valid; and  
20 means for setting the thread valid indicators, for those threads for which the EA entry is no longer valid, to invalid in the EA entry.

16. The apparatus of Claim 10, further comprising  
25 writing the EA to the ERAT table.

17. The apparatus of Claim 16, further comprising:  
means for presenting the EA used by the thread;  
means for determining that the EA does not match any  
30 entry in the ERAT table;  
means for retrieving an RA for the EA using a secondary translation;  
means for writing a new entry containing the EA; and

means for setting the entry's thread valid indicator to show the EA entry is valid for the thread.

18. The apparatus of Claim 17, wherein the entry's  
5 thread valid indicators are set to show the entry is valid for all threads using the EA to refer to the RA.

19. A computer program product for efficiently storing an effective address (EA) used by a thread in an Effective  
10 to Real Address Translation (ERAT) table, in a main processing unit (MPU) having two or more threads, the computer program product having a medium with a computer program embodied thereon, the computer program comprising:

computer program code for defining a thread valid  
15 indicator for each thread in the MPU;

computer program code for storing an EA using one ERAT table entry; and

computer program code for setting a thread valid indicator in the ERAT table entry for each thread using the  
20 EA to refer to the same RA.

20. The computer program product of Claim 19, further comprising translating the EA to an RA using an ERAT table.

25 21. The computer program product of Claim 20, further comprising:

computer program code for determining whether the EA matches an ERAT table entry;

upon determining that the EA matches an ERAT table  
30 entry, computer program code for determining whether the matching entry is marked valid for this thread;

upon determining that the matching entry is marked valid for this thread, computer program code for looking up

the corresponding RA in the data array table and computer code for outputting the RA;

upon determining that the matching entry is not marked valid for this thread but is marked valid for other threads,  
5 computer program code for determining whether the information in the matching entry is correct for this thread;

upon determining that the information in the matching entry is correct for this thread, computer program code for  
10 setting a valid indicator marking the entry as valid for this thread also;

upon determining that the information in the matching entry is not correct for this thread, or that the EA does not match any ERAT table entry, computer program code for  
15 writing a new ERAT table entry for the EA and computer program code for marking it valid for this thread.

22. The computer program product of Claim 21, wherein when writing a new ERAT table entry for the EA, the entry's  
20 thread valid indicators are set to show the entry is valid for all threads using the EA to refer to the RA.

23. The computer program product of Claim 19, further comprising invalidating the EA entry in the ERAT table.  
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24. The computer program product of Claim 23, further comprising:

computer program code for determining the threads for which the EA entry is no longer valid; and

30 computer program code for setting the thread valid indicators, for those threads for which the EA entry is no longer valid, to invalid in the EA entry.

25. The computer program product of Claim 19, further comprising writing the EA to the ERAT table.

26. The computer program product of Claim 25, further  
5 comprising:

computer program code for presenting the EA used by the thread;

computer program code for determining that the EA does not match any entry in the ERAT table;

10 computer program code for retrieving an RA for the EA using a secondary translation;

computer program code for writing a new entry containing the EA; and

15 computer program code for setting the entry's thread valid indicator to show the EA entry is valid for the thread.

27. The computer program product of Claim 26, wherein the entry's thread valid indicators are set to show the  
20 entry is valid for all threads using the EA to refer to the RA.